National Weather Service Des Moines' Newsletter

THE WEATHER WHISPER

Volume 5 Issue 2 **Summer 2011**

Hubbard Observer Receives the Edward H. Stoll Award

by Brad Fillbach, Hydro-Meteorological Technician/Cooperative Program Manager

Bev Chaplin of Hubbard, Iowa received the Edward H. Stoll Award for 50 years as a Cooperative Weather Observer from Brad Fillbach, Cooperative Program Manager at the National Weather Service Des Moines. The Edward H. Stoll Award was created in 1975. It is presented to a Cooperative Weather Observer who has completed 50 years of service. It is named for Ed Stoll who recorded his Coop observations for 76 years, beginning in 1905 at the age of 18.

Bev began taking observations for Hubbard in March 1961 after her neighbor died and a replacement observer was needed. Bev has continued to send rainfall and snowfall data to the National Weather Service ever since. Bev enjoys taking weather observations, though admits the snowfall observations are tough sometimes. Bev wants to stay active taking observations for as long as she is able. Bev says she has received good help from her four boys over the years with the observations and her sons remain interested in her daily reports.

Bev has been, and remains, very active in the Hubbard community. She worked for the Hubbad-Radcliffe schools for 44 years as a bus driver and fill-in custodian. In 1965 she began mowing the Hubbard cemetery and continued until a few years ago; she still remains the secretary for the cemetery. Bev has also been working with the Hubbard food pantry since day one, roughly 20 years. In addition, Bev has been a member of the American Legion Auxiliary for 46 years, with the goal of reaching 50 years.

Thank you Bev for your five decades of dedication to the Cooperative Weather Program!

Picture: Bev (front row, 2nd from left) is surrounded by family, friends and NWS Des Moines employees as she proudly displays her Edward H. Stoll award.

IN THIS ISSUE

Editors

Ken Podrazik
Aubry Wilkins

StormReady® Update *by Brad Small, Senior Forecaster*

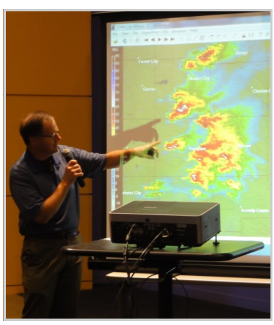
2011 has already been an active year for the National Weather Service Des Moines StormReady® program. Grinnell College, Drake University, Carroll County, Polk County, Iowa State University and the City of Dallas Center have all renewed their status recently, with Mahaska County becoming StormReady® for the first time as well. These communities, along with Marshall County and the City of Newton, comprise the nine StormReady® entities in the NWS Des Moines forecast area.

There are more than 1,750 StormReady® communities in the United States and 29 across the state of Iowa. The program is voluntary and provides cities, counties, universities, colleges and others with clear-cut advice from a partnership between local NWS forecast offices and local emergency management officials. To be recognized as StormReady® an entity must:

- Establish a 24-hour warning point and/or emergency operations center
- Have more than one way to receive severe weather forecasts and warnings and to alert the public
- Create a system that monitors local weather conditions
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather operations plan which includes training severe weather spotters and holding emergency exercises

If your city, county or community would be interesting in learning more about the NWS StormReady® program, or would like to submit an application, please contact Brad Small (bradley.small@noaa.gov) Central Iowa StormReady® Program Leader. Additional information on the StormReady® program can also be found by visiting http://www.stormready.noaa.gov.

NWS Speaks at Science Center for Café Scientifique and "Tornado Alley" IMAX Screening *by Kevin Deitsch, Meteorologist Intern*



Storm chasing is a hobby many people take up, regardless of their meteorological background. When instability is sufficient and the winds strongly change directions with height, once the skies begin to darken many weather enthusiasts hit the road. One such man is Sean Casey, the creator of the *Tornado Alley* movie. He has worked tirelessly for eight years, building a massive armored car and trying desperately to get inside the path of a tornado. He finally got his long-awaited shot, promptly making it into an IMAX film.

A team of three NWS meteorologists were invited to the Science Center of Iowa on July 12 for a screening of the film. The team was asked to give a presentation on storm chasing, which caused a bit of hesitation. Instead of grabbing a laptop, gassing up and hopping in a car like Mr. Casey, NWS meteorologists chase storms in a different way. They are able to see storms from their Johnston office using an expensive tool, a Doppler radar. The presentation at the science center (photo bottom left) focused on the radar's ability to gather data from storms, along with the techniques NWS meteorologists use to interpret its information. The presenters examined three separate severe weather events. Roger Vachalek (photo top left) and Kevin Skow discussed the cases, one of which was the killer Parkersburg EF-5 tornado that devastated many areas along its 43-mile track. They described the radar's ability to "chase" storms, explaining how a Doppler uses beams of electromagnetic radiation to see storm structure, intensity, and wind speed. The next portion of the presentation was dedicated to a discussion of safety during tornadoes and severe wind events. Kevin Deitsch (photo top right) discussed ten tips to help prepare for severe weather, while enforcing the theme, "People don't plan to fail, they fail to plan" (see preparation guide page 3). The group of about 30 people then assembled in the IMAX theater to watch *Tornado Alley*.

Preparation Guide for Major Severe Weather Events

by Roger Vachalek, Senior Forecaster

The 2011 severe storm season will be remembered as one of the worst ever on record across the United States. From the devastating tornado that hit Joplin, Missouri on May 23 leaving 159 dead, to the Deep South and Mid-Atlantic States outbreak on April 27 which left at least 317 people dead this has been an unprecedented year. So far, roughly 550 persons have died in tornados alone. There have also been fatalities associated with extreme severe thunderstorm winds and fallen trees. Fortunately, Iowa and Central Iowa have been spared this year from the extensive and extreme tornado outbreaks that hit the south earlier this spring. Though major extreme severe weather events like this are unavoidable, thankfully they do not frequently occur. These events differ in many ways from most of the severe weather events that occur in Iowa. However, a quick check of memory reminds us that events like the July 11, 2011 Derecho and the Parkersburg Tornado of May 25, 2008 fall into this category of extreme severe weather events.

Your safety depends on three things. First and foremost – you and your family need to react quickly when storms hit. Secondly, you and your family should be practiced and prepared well in advance for extreme weather events. Finally, you need ample warning and lead time to get to safety before the storm hits. Here at the National Weather Service we provide you with the warning and as best we can, the most lead time possible. But it's up to you to be practiced, ready, and quick to respond once extreme weather approaches. Below is a ten-step guide to help you get ready for a major weather outbreak.

Family Safety Plan – *"People Don't Plan to Fail - They Fail to Plan"*

1. **Decide where everyone will meet** in the event of a tornado and where they will be afterwards – Basement? Storm shelter? Lowest floor of your living quarters? Maybe a building that is better suited than the one you live? Make sure that you are protected by the area you seek to take shelter. If you ride bikes – use your bike helmet to protect your head from injury.
2. If **family members are away for the day** (children at camp, activities) **make sure that they have a place of safety** to go to in the event of a tornado/severe weather. Ask the organizers of the event or camp about their safety plans! Don't let family members be left in the hands of unprepared individuals.
3. Make sure **family members who are caught outside** (driving or outdoors) know how and where to seek the best possible shelter.
4. **Create a safety communication plan**. Make sure that you know the location of all family members in the event you are split up and are not able to meet at home. Arrange for family members to call you if a tornado warning is issued. Have everyone call home once the event is over, account for all family members.
5. **Gather supplies for the event**. At least one to two days of non-perishable food, water, first-aid kit, non-electric can opener, chocolate or energy bars, flashlight, weather radio with batteries. Important life-documents should be moved to the shelter location for the duration of the event. **These items should be brought to or stored in the designated "family safety spot" prior to the event, such as earlier in the day.**
6. **Stay alert to the weather conditions!** Keep a television or radio on; use a cell phone application to get weather alerts, **have a NOAA Weather Radio on hand** for overnight warnings when family members may be sleeping.
7. **React to Tornado and Extreme Wind Warnings with Urgency!** Seconds save lives. Once it reaches your location, it only takes 15 to 20 seconds for an EF-5 tornado to completely destroy an average home. If you have not previously determined where to meet and stay safe, you have already lost valuable time.
8. **When planning for a tornado safe location** designate the sturdiest location of your home, *that location* and preferably underground (basement is best, lowest floor interior room is next best).
9. **Have blankets in the place of safety.** If you have **a bike, football, or motorcycle helmet – use it!** It may protect your head and face from falling objects.
10. **Practice! Practice! Practice! Get your family involved. The more you plan now, the more likely you will be ready for the unexpected!**

2011 Iowa State Fair Booth *by Jeff Johnson, Warning Coordination Meteorologist*

The 2010 Emergency Management and NWS State Fair Booth

The National Weather Service and the Iowa Emergency Management Association will team-up once again for a combined agency booth at the 2011 Iowa State Fair. The booth will be in the Hall of Flame which is under the Grandstand. This year's booth will contain information about recent and past severe weather events in Iowa, information about emergency preparedness and safety, Iowa's weather history and how Emergency Management and the National Weather Service work together to fulfill our combined mission of protecting life and property. Emergency Management and National Weather Service personnel will be staffing the booth to answer the public's question. The 2011 Iowa State Fair will run August 11-21 in Des Moines.

Outlook for August into Fall 2011

by Miles Schumacher, Senior Forecaster

The warm weather so far this summer has been stronger than is typically the case with second year La Niña patterns. June was warmer than normal, with July being considerably warmer. The hot weather in July turned out to be more than was originally expected. Rainfall became sparser during July, which aided in the warming. During the course of the summer the La Niña pattern continued to weaken with the best description of the pattern being neutral.

Although La Niña has weakened, the Pacific Decadal Oscillation (PDO) in the Pacific Ocean remains in a negative, or cold phase. The characteristics of -PDO include water that is generally cooler than normal around the edges of the basin, with a warm pool in the central Pacific. Although warm water can be seen spreading west from South America, similar to what one would expect with the onset of El Niño, it is not likely to develop into an El Niño. One reason is that the warm water is relatively shallow. Also, the presence of the –PDO favors a La Niña pattern by a 2 to 1 margin as it tends to dominate the overall pattern. The opposite is true during the warm phase of PDO, as was seen in the 1977-2005 period. The current temperature departures for the equatorial Pacific are shown in Figure 1. Note both the warm water off of northwest South America as well as the negative PDO signal of warm water in the middle of the Pacific and cool water around it.

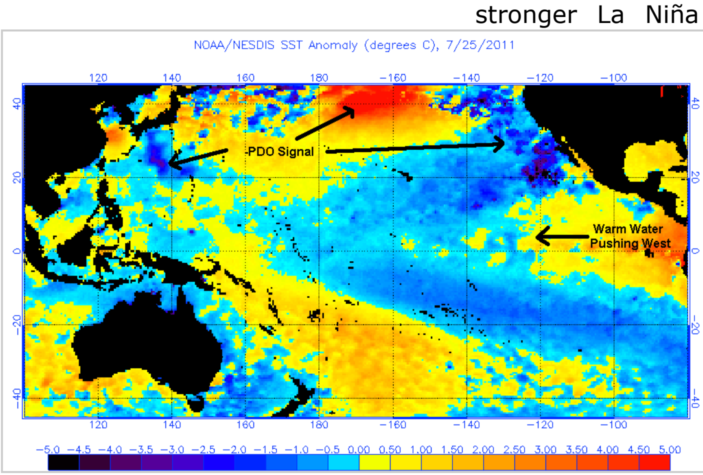


Figure 1: Sea Surface Temperature departure from normal, equatorial Pacific.

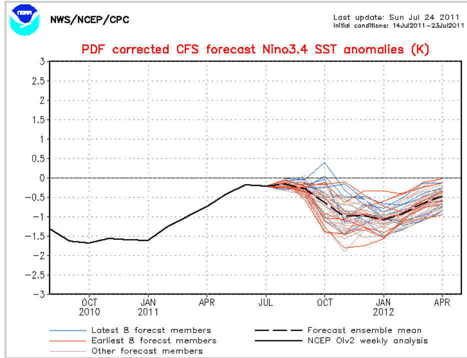


Figure 2: Sea Surface Temperature departure for the past year and projection into Spring 2012. Departure in degrees K is show on the ordinate, with time on the abscissa.

The atmosphere typically follows a 3-7 year cycle between El Niño and La Niña. Depending on the phase of the PDO, El Niño/La Niña is favored during warm/cold phase of the PDO. It is quite common during the cold phase of PDO for La Niña to return in a weaker form for a second winter season. This was most recently seen during the last La Niña event where a La Niña in the winter of 2007-08 was followed by a weaker one in the winter of 2008-09. Model forecasts suggest La Niña will return this winter, though quite a bit weaker than we saw last winter. It is likely to persist into the spring of 2012. Figure 2 below shows the central Pacific Sea Surface Temperature departure (black line) and a series of forecasts (red and blue lines) through the time period based on the initial conditions from 14-23 July 2011. As can be seen from the figure, there is a significant spread in the forecasts from the early fall months forward. It should be noted that this forecast is based on one model only. This model suggests a stronger La Niña signal than the overall average, but most of the 24 models used suggest at least a weak La Niña developing this fall into the winter. The influence of La Niña is much weaker in the summer and fall than during the winter months.

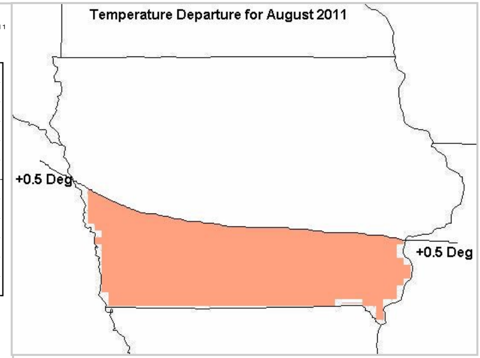


Figure 3: Mean temperature departure for August.

Although in meteorology no two years are the same strictly speaking, one can look at weather patterns of the recent past to give some indications of near term weather trends in the future. This forecast is based on the best fit from several of the years that were similar to the winter pattern so far. Considerations were also made for the state of La Niña and other factors that control our weather.

For the month of August, there is no real signal with respect to rainfall. It is most likely that rainfall in August will average close to normal, or a little below normal. August will likely begin the transition into fall. After a warm June and hot July, it is most likely the warmer weather will be suppressed with above normal temperatures extending across southern Iowa and areas south. See Figure 3.

It is likely that as La Niña begins to return this fall that we will see some influence on the weather, especially toward October and November.

There can be considerable variability from one La Niña event to another, but there are some weak signals for the fall season. Quite often a cooler equatorial Pacific will lead to the development of more troughs in the western U.S. This tilts the odds toward slightly warmer and wetter weather during the fall. September is the most likely month to be warmer than normal and we may see a reversal from August with much of the month averaging above normal. Overall, the fall is likely to average a little above normal over the northeast and close to normal over the southwest. Precipitation is

(Continued on page 5)

A New and Improved Ceilometer on ASOS Systems Around the Country *by David Reese, Electronic Systems Analyst*

The National Weather Service and the Federal Aviation Administration are installing the new Vaisala CL31 Ceilometers at all ASOS sites. The new ceilometers provide excellent performance and reliability in all weather conditions up to 25,000 feet. The previous version, CTK12 Ceilometer, only provided data up to 12,000 feet.
The Vaisala Ceilometer CL31 is a compact and lightweight instrument for cloud base height and vertical visibility measurements. It detects three cloud layers simultaneously. The CL31 employs a pulsed diode laser LIDAR (light detection and ranging) technology. The CL31 is ideal for aviation and meteorological applications. The CL31 is fully automatic. In addition to cloud height data, the messages contain instrument status information based on comprehensive self-diagnostic routines. In case of a malfunction the diagnostics help users to identify the failed module.

The overview of the CL31 concludes as follows:

- Second generation of advanced single lens optics provides excellent performance also at low altitudes
- Reliable operation in all weather: unsurpassed performance in vertical visibility and cloud detection during precipitation
- Fast measurement enables detection of thin cloud layers below a solid cloud base
- Modular design for easy installation and maintenance
- Extensive self-diagnostics with fault analysis
- Approved and deployed by the US-FAA
- Selected by the National Weather Service of USA

The Technical Specifications:
Performance

Measurement range	0...25,000 feet (0...7.5 km)
Reporting resolution	5 meters /10 feet (units selectable)
Reporting cycle	programmable, 2...120 seconds

Reported quantities
Cloud hits (up to 3 layers) and status information
Cloud hits, status and backscatter profile
Operating environment

Temperature	-40...+60 °C (-40...+140 °F)
Relative humidity	0...100 %RH
Wind	55 m/s

Picture of whole sky from one point
The algorithm is used to construct an image of the whole sky based on the ceilometer measurements only from one single point. The sky condition algorithm uses a time series of ceilometer data to calculate the cloud amount of different cloud layers and the corresponding layer heights. Sky Condition algorithms are generally used in automatic surface weather stations and in airport weather monitoring systems.

Reliable results with automatic measurement
The new Sky Condition Algorithm has shown good results in comparison to sky condition reported by human observers (1. For comparison, success percentage values for the ASOS ceilometer algorithm) (2, CT25K embedded algorithm and the new Sky Condition algorithms.)

Fall Outlook

(Continued from page 4)
mostly likely to be normal or a little above normal, especially over the south and west. See Figure 4 for details.

These outlooks are based more heavily on statistics than many of the methods used by the Climate Prediction Center. The complete set of official forecasts from the Climate Prediction Center can be found on our website.

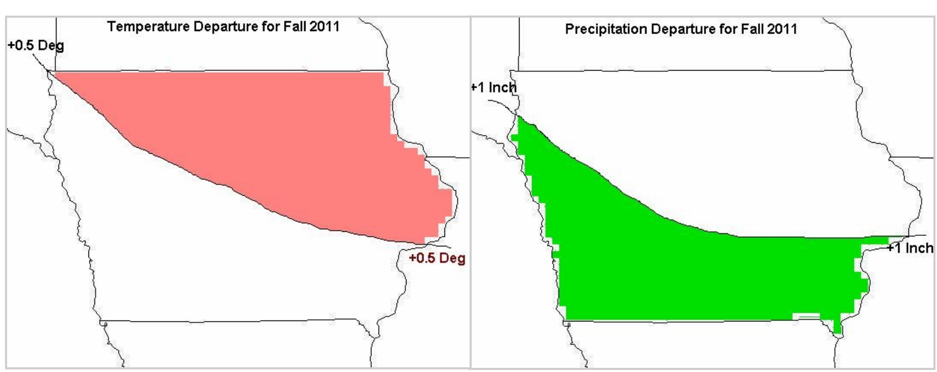


Figure 4: Mean temperature (left) and precipitation (right) departure forecast for the Fall.

2011 Cooperative Observer Length of Service Awards

by Brad Fillbach, Hydro-Meteorological Technician/Cooperative Program Manager and Robert DeRoy, Data Acquisition Program Manager

- ☺ Top Left Photo: Gene (left) and Jerry (right) Johnson of Zearing, Iowa receive their 10 year Length of Service Award. Picture taken by Rob Deroy, DAPM, NWS WFO Des Moines.
- ☺ Top Right Photo: Duane Woodward of Atlantic 5SW, Iowa receives his 35 year Length of Service Award.
- ☺ Bottom Left Photo: Dan Wilson of Ogden, Iowa receives his 35 year Length of Service Award from Rob Deroy, DAPM, WFO Des Moines.
- ☺ Bottom Right Photo: Robert Anderson (right) of Harcourt, Iowa receives his 15 year Length of Service Award pictured with wife Charlene and grandson Kye. Picture taken by Rob Deroy, DAPM, NWS WFO Des Moines.

NWS and Ongoing Missouri River Flooding *by Brenda Brock, Meteorologist In Charge*

The National Weather Service, Des Moines is the NWS liaison for the ongoing state of Iowa Emergency Operations Center activation. Decision Support Service at the State Emergency Operations Center began with the Mississippi River floods during the spring, and will continue throughout the summer for the Missouri River floods.

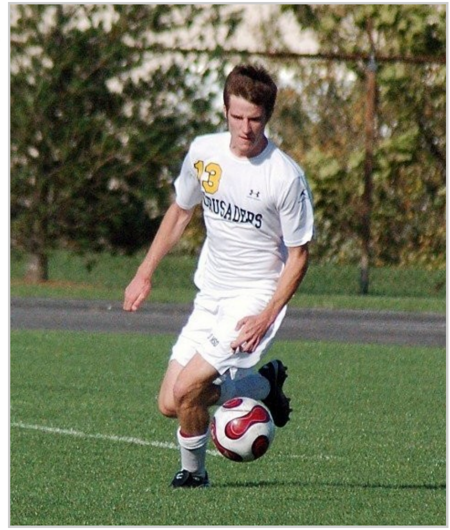
Jeffrey Zogg- Senior Hydrologist, Brenda Brock– Meteorologist in Charge and Jeffrey Johnson- Warning Coordination Meteorologist, are the primary EOC agency support team members.

Brig. Gen. J. Derek Hill, Administrator, Iowa Homeland Security/Emergency Management, stated appreciation for the NWS support and emphasized the importance of the briefings for the safety of the responders in addition to river level updates.

Jeff Zogg of the NWS along with Joyce Flinn and Brig. Gen. Derek Hill of HSEMD at the SEOC.

Employee Spotlight *Kevin Deitsch, Meteorologist Intern*

My interest in meteorology, like most meteorologists, began in my own backyard in Cincinnati, Ohio. Whenever a good storm would approach, my father and I would make some popcorn and go out onto the porch and watch the incoming storm. Although my father has since passed, my passion for meteorology has continued to flourish. I knew I wanted to follow a career in meteorology, but I also wanted to pursue my soccer career, so Valparaiso University was the place for me. There I was able to get highly involved in meteorology while also playing the sport I love. While at Valparaiso, I was a forecaster for the local school district (I forecast winter weather, advising them when to call off schools). Additionally, I participated in an internship with MIT and Lincoln Labs studying aviation icing. The most fun thing I did at Valparaiso was storm chasing! Each year, two 10-day chases would be held through the school. I was lucky enough to participate in 3 of these chases, logging a total of 30 days of storm chasing and over 18,000 miles driven. I also saw 2 tornadoes. These experiences at Valparaiso allowed me to acquire a SCEP position in Wilmington, Ohio. At Wilmington, I was able to acquire essential knowledge and experience which has allowed me to transition quickly into a Met Intern here in Des Moines, IA. My interests within the NWS include severe weather and outreach. These two interests go hand-in-hand, as it is essential we continue to learn more about dangerous severe weather and thunderstorms. As we continue to gain knowledge scientifically, then we will be able to keep the public safe and serve their needs more efficiently.



Kevin Deitsch playing for Valparaiso against Michigan State in 2008.

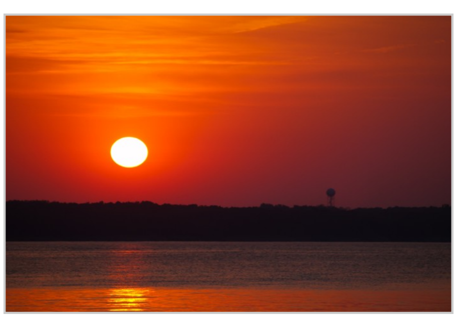
Employee Spotlight

Kevin Skow, Meteorologist Intern

My name is Kevin Skow, one of the newest staff members of the NWS in Des Moines. I grew up in the northern suburbs of Minneapolis, MN, primarily in the cities of Coon Rapids, Andover, and Anoka. My passion for the weather began in my early childhood when I became interested in hurricanes and floods. The July 1, 1997 derecho that plowed through my neighborhood sparked my fascination with severe weather and tornadoes. I graduated from Anoka High School in 2005 and earned my Bachelor's Degree in Atmospheric Sciences from the University of North Dakota in 2009.

I joined the National Weather Service in November of 2009 when I was hired as an Intern Meteorologist for the Anchorage, Alaska office. My duties there included launching weather balloons, taking synoptic weather observations, maintaining the climate database, and helping out with putting together the forecast. I transferred to the Des Moines office in March of this year, where my duties remain the same (minus launching weather balloons). I have thoroughly enjoyed my time in Des Moines along with Iowa's exciting weather. My interests, besides weather, include Great Lakes shipping, photography, computer repair, and biking.

Photos by Kevin Skow: Saylorville Lake with Doppler Radar (left) and Lightning over Urbandale (right). The photo on page 16 is also one of Kevin's.



Climatological Data for March through June 2011

Location	Month	Average Temp	Departure	Highest	Lowest	Rain / Snow	Departure
Des Moines	Mar	39.3°F	+0.9°F	74°F (17th)	12°F (2nd)	2.16" / 5.5"	+2.21" / -0.5"
	Apr	51.7°F	+1.1°F	90°F (10th)	29°F (5th)	4.97" / T	+1.39" / -2.7"
	May	62.9°F	+1.0°F	95°F (10th)	32°F (3rd)	6.04" / 0.0"	+1.79" / 0.0"
	Jun	72.7°F	+1.3°F	96°F (6th, 30th)	54°F (24th)	10.28" / 0.0"	+5.71" / NA
Mason City	Mar	31.0°F	-1.9°F	57°F (16th)	1°F (2nd)	2.60" / 4.9"	+0.36" / M
	Apr	52.5°F	+6.1°F	86°F (1st)	22°F (9th)	3.99" / 0.0"	+0.63" / M
	May	57.6°F	-1.4°F	94°F (10th)	26°F (4th, 2nd)	3.85" / 0.0"	-0.49" / M
	Jun	68.9°F	+0.2°F	99°F (7th)	48°F (12th)	4.24" / M	-0.72" / M
Waterloo	Mar	34.0°F	-1.0°F	66°F (17th)	8°F (2nd)	1.79" / 1.6"	-0.34" / M
	Apr	54.0°F	+6.2°F	84°F (1st)	29°F (9th)	5.10" / 0.0"	+1.87" / M
	May	59.3°F	-0.9°F	93°F (10th)	27°F (4th)	3.65" / M	-0.50" / M
	Jun	70.0°F	+0.1°F	97°F (6th)	49°F (12th)	3.89" / M	-0.93" / M
Ottumwa	Mar	38.8°F	-0.8°F	74°F (17th)	17°F (2nd)	2.25" / M	-0.10" / M
	Apr	56.6°F	+5.0°F	87°F (1st)	31°F (9th)	2.61" / M	-0.67" / M
	May	60.8°F	-2.1°F	92°F (10th)	29°F (3rd)	5.70" / M	+1.14" / M
	Jun	70.4°F	-2.1°F	93°F (6th, 30th)	50°F (1st)	9.21" / M	+4.70" / M

Fire Weather Information *by Frank Boksa, General Forecaster*

The fire weather season has reached the summer doldrums for the time being but we had a fairly active spring, despite the late start to the burn season. Many thanks to the County Conservation folks who volunteer to give the National Weather Service greenness data of native warm season grasses and provide helpful input along the way. They are an invaluable resource. We did have occasion to issue several Grassland Fire Danger Index products this past spring primarily due to high winds and low humidity before grasses sufficiently greened up. The RFD product can be viewed on our webpage and is headlined on our page when in effect.

Despite the cool and wet spring there were 11 spot requests made in March, 68 in April, 42 in May and only 1 in June for a total of 122 spot requests. That was nearly as many requests as we had for the entire year in 2010. During the spring green up season a study was conducted comparing the greenness data received from our volunteers and satellite derived greenness data. Surprisingly, the satellite greenness data was pretty close to observed values. However, the satellite data cannot discern between warm and cool season grasses so there is definitely some error in this reading. Satellite greenness data will however be used to try and fill in the gaps between observed sites and non-observed sites and a study will continue for the fall to see how values compare when plants dry down.

The fall reporting of greenness data from volunteers will begin on September 1 and continue through November 15. Our study comparing satellite greenness data to observed data will commence during that time as well. If the hot and dry weather continues these dates may need to be bumped up a bit.

We want your feedback! We want to hear about your favorite stories and features. Or, if there is something you would like to see in an upcoming issue, let us know! Contact the editors at: Kenneth.Podrazik@noaa.gov or Aubry.Wilkins@noaa.gov

2011 Weather Review To Date

by Craig Cogil, Senior Forecaster

Temperatures for the first seven months of 2011 were below normal as a whole for much of Iowa. The first five months were below normal with the largest departures occurring during the winter months. However, as summer arrived, temperatures climbed above normal in June with the heat intensifying during July. Figure 1 shows the departures from normal with the largest below normal areas in west central Iowa into northern portions of the state. Any warmer than normal areas for the first seven months of the year are confined to the far south and eastern Iowa near along the Mississippi River.

Figure 2 is the departure of temperatures since the beginning of July. This indicates that temperatures across the entire state are running well above normal for July. Most of the state is from 2 to 6 degrees above normal for July with some locations in the south from 6 to 8 degrees warmer than normal. This recent warmth is what has helped some of the southern areas climb above normal up to this point in the year.

Rainfall was near normal for much of the state through the first seven months of the year. Departures through the first several months of the year were not very large, with most locations receiving sufficient rainfall. With the arrival of summer, rainfall became heavier but also much more spotty leading to some areas staying above normal as other locations began to show a deficit for the year. The largest deficits were along the Highway 20 corridor from west central into central Iowa as well as in the southwest corner of the state. The largest surplus during this time was from just south of Des Moines into Southeast Iowa where very heavy rainfall was common during the month of July. The other surplus areas were in northwest Iowa as well as near Dubuque were record rainfall near the end of July produced over ten inches of rain in less than 12 hours. The dry weather in July, especially in southern Iowa, began to draw down soil moisture across the area as crops matured and heat intensified. Drought conditions that have been across the southern and central Plains were creeping toward Iowa with incipient drought conditions approaching the southwest corner of the state. Figure 3 shows the percent of normal precipitation across the state for January through the end of July.

Figure 1

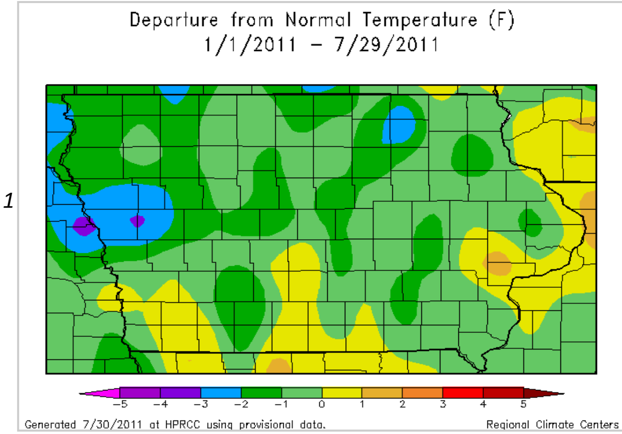


Figure 2

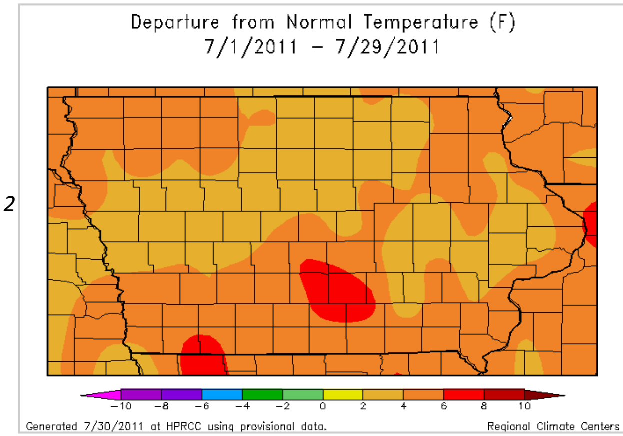
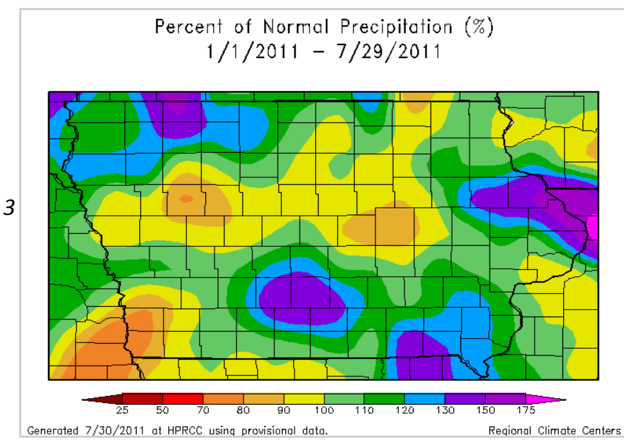


Figure 3



Iowa Statewide Averages and Rankings for Temperature and Precipitation for the First Half of the Year

by Craig Cogil, Senior Forecaster

Month	Temperature	Departure from Normal	Rainfall	Departure from Normal	Temperature Ranking	Precipitation Ranking
January 2011	15.1°F	-2.7°F	0.90”	-0.05”	42nd Coolest	67th Driest
February 2011	22.8°F	-1.4°F	1.45”	+0.47”	69th Coolest	51st Wettest
March 2011	35.6°F	-0.4°F	1.52”	-0.66”	62nd Warmest	55th Driest
April 2011	48.2°F	-0.3°F	3.83”	+0.50”	58th Coolest	32nd Wettest
May 2011	59.9°F	-0.3°F	4.93”	+0.71”	70th Coolest	38th Wettest
June 2011	70.4°F	+0.6°F	6.25”	+1.61”	53rd Warmest	27th Wettest

Rankings are based upon 139 years of records. All values are preliminary.

Damage vs. Damage: A Look Back at Two Powerful Summer Storms

by Jake Beitlich, Meteorologist Intern

Anyone living in Iowa knows that thunderstorms and tornadoes can occur anywhere and anytime during the spring and summer months. This year, two particularly devastating severe weather events rolled through Iowa and caused millions of dollars in damage. The first event occurred on the evening of April 9, when 17 tornadoes touched down statewide. The tornadic storms started in west central Iowa, and moved northeastward. There were several violent tornadoes, including the Mapleton EF3 tornado, and an EF4 tornado near Pocahontas. Despite the numerous tornadoes and widespread damage, people did the right thing by seeking shelter, and there were no fatalities.

The second event occurred during the early morning hours of July 11, when a strong bow echo produced a wide swath of 80 to 100 mph straight-line winds across east central Iowa, with a few locations experiencing winds in excess of 100 mph. The worst damage began just north of Des Moines, and continued eastward through Marshall, Tama, and Benton Counties. Again, many structures were either damaged or completely destroyed from the straight-line winds. Even though this event occurred during the middle of the night, people in their homes took shelter, and there were no deaths. The purpose of this article is to demonstrate that high-end severe thunderstorms can be just as catastrophic as many tornadoes.

Tornadic wind speeds are rated based on observed damage using the EF (Enhanced Fujita) scale. This is mainly due to the fact that exact wind measurements inside a tornado are virtually impossible to capture. Therefore, based on the structural integrity of engineered buildings and other objects, meteorologists are able to estimate the wind speeds and rate the tornado (Table 1). Most tornadoes that occur are EF0 or EF1, which is comparable to a high-end straight-line windstorm. The pictures below show a comparison of the damaged caused by tornadoes on April 9 (left) and straight-line winds on July 11 (right).

Tornado Damage

Straight-Line Wind Damage

The images above compare the damage caused by a tornado (left) and straight-line winds (right). Damage of this nature falls between EF1-EF2, with wind speeds estimated in the 90–110 mph range. These side-by-side images show that high-end severe thunderstorms can be just as destructive and potentially dangerous as typical tornadoes.
1A: Corn bins west of Vinton Iowa.
1B: grain bins southwest of Marshalltown.
2A: Power poles snapped off in rural Sac County.
2B: Power poles snapped south of Dysart.
3A: Gymnasium damage in Vinton.
3B: Damage to industrial building south of Traer.

Rating	Wind Speed (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Table 1: The range of wind speed for a given EF rating. It should be noted that over 90% of all tornadoes are only EF0 or EF1.

July 11, 2011 Derecho: A Quick Overview *by Kevin Deitsch, Meteorologist Intern*

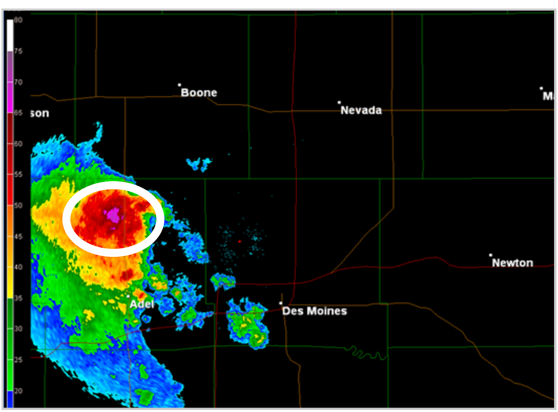
The morning of July 11, 2011 will not soon be forgotten by many people across central and eastern Iowa. During the pre-dawn hours, a powerful and long lasting straight-line windstorm, known as a derecho, plowed across east central Iowa.

A weak cold front initially sparked a strong line of thunderstorms in western Minnesota on the afternoon of July 10. A second cluster of low-end severe storms developed near sunset over Nebraska due to the front and a strengthening low-level jet. The two thunderstorm complexes continued toward Iowa and entered the state around 1:00 AM as marginally severe clusters.

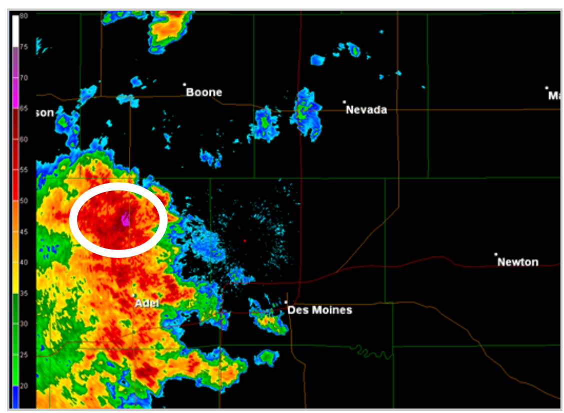
The state of Iowa had very favorable conditions for severe weather. Meteorologists use the term Convective Available Potential Energy (CAPE) as a way to measure the amount of instability in the atmosphere. CAPE values were 3,000-4,000 J/kg, which is extremely high for this time of night. In addition, Iowa had 30 knots of shear in the lowest 3 km of the atmosphere. Shear refers to the change of wind speed and direction through a certain depth of the atmosphere. Shear is helpful in severe thunderstorm potential as it can organize thunderstorm updrafts and downdrafts, keeping them separate which typically allows the storm to last longer. This combination of instability and shear led to the rapid intensification and organization of a thunderstorm just west of the Des Moines area. As this storm strengthened, it developed a large hail core aloft in the storm. This hail quickly fell out of the storm updraft, rapidly cooling the air beneath the cloud as it melted. Due to density differences (warm air rises, cold air sinks), the cold air rapidly descended (Figure 1). This descending cold air and heavy rain interacted with very fast winds above the surface, forcing the strong winds to the ground in a process known as precipitation drag. The cold pool and intense winds quickly spread out and accelerated as they hit the ground, organizing the storms into a classic bow shape.

The newly organized thunderstorm complex raced over eastern Story, Marshall, and Tama Counties, blasting these areas with winds exceeding 105 mph. The

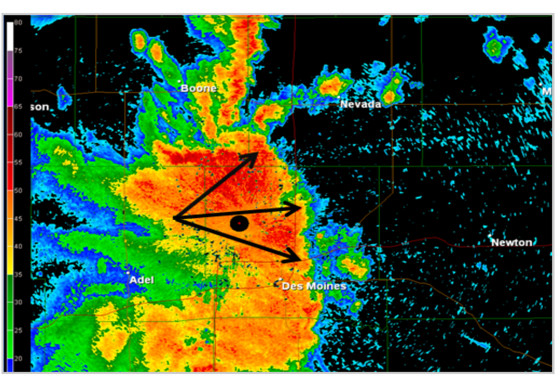
(Continued on page 12)



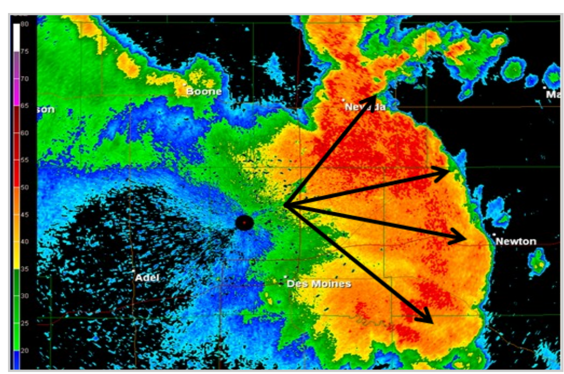
Reflectivity at 15.6° at 3:04AM: The circled area shows the intense hail core, with the highest reflectivity (pink) of 72 dBz located 26,000 feet off the ground.



Reflectivity at 6.4° at 3:09AM: The main hail core is now at 9,800 ft. It has rapidly decreased in size (melting), and has dropped in elevation, consistent with a cold pool descending to the surface.



Reflectivity at 0.5° at 3:28AM: This is near the time when the first reports of significant damage started. It is clear the cold pool has reached the surface and begun to spread outward.



Reflectivity at 0.5° at 3:51AM: The cold pool has continued spreading outward, organizing the storms into a destructive bow echo.

NWS To Begin Using New Normals *by Aubry Wilkins, General Forecaster*

NOAA's National Climatic Data Center (NCDC) has released new Normals which will begin being used by NWS offices August 1. These Normals include the 30-year period from 1981-2010. A "normal" is a 30-year average of a particular variable, such as temperature or precipitation. The new Normals replace the previous Normals which included the period 1971-2000. New Normals will be used for all climate sites, including COOP sites, and will include new values for: temperature, precipitation, snowfall, snow depth and heating and cooling degree days. Nationwide, new climate normals will be issued for over 9,800 stations.

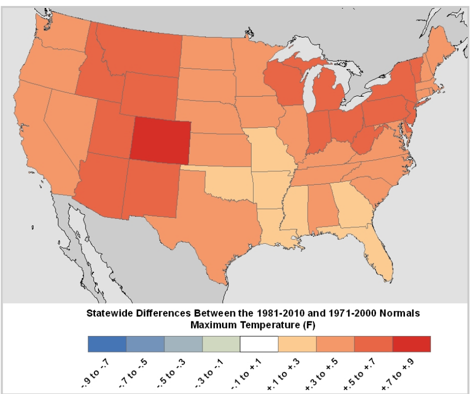


Figure 1: Statewide difference between maximum temperature

Why do we need new Normals? The World Meteorological Organization (WMO) mandates that each member nation compute 30-year Normals at least once every 30 years; it recommends that 30-year Normals are computed every 10 years. The United States is a member nation of the WMO and so NOAA computes new 30-year Normals once every 10 years. New Normals are computed every decade to include new stations and new observation technology. An act of congress passed in 1890 mandates that a record of climatic conditions of the United States be established.

Figures 1 and 2 show the averaged annual statewide changes in maximum and minimum temperatures when comparing 1971-2000 Normals to 1981-2010 Normals using the same methodology. It is important to remember to use care when interpreting changes between one set of Normals and another. Differences between the reported 1971-2000 Normals and the 1981-2010 Normals may be due to station moves, changes in methodology, changes in instrumentation, etc. that are not reflective of real changes in the underlying climate signal.

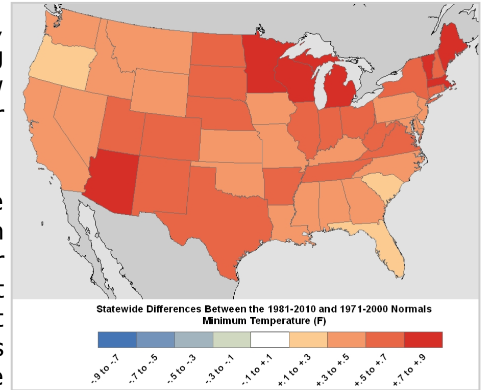


Figure 2: Statewide difference between minimum temperature

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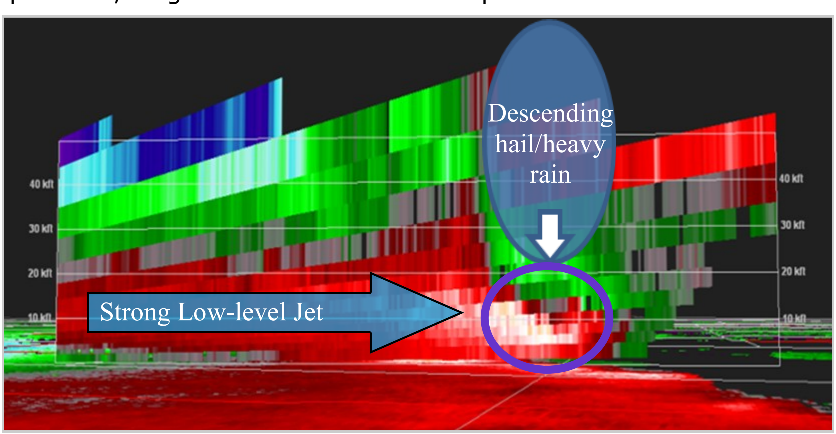
Derecho Overview

(Continued from page 11)

derecho continued to track eastward, plowing through eastern Iowa and the southern Great Lakes region before dissipating in West Virginia in the mid-afternoon. Thankfully, no lives were lost, but numerous structures were damaged or destroyed from this powerful, long-lived thunderstorm complex.



Cross-section of velocities at 3:51AM: The low-level jet (bright red colors) is clearly being pushed down to the ground due to the descending cold pool/precipitation drag processes. The circled area depicts where winds in excess of 105 MPH where being forced to the ground.

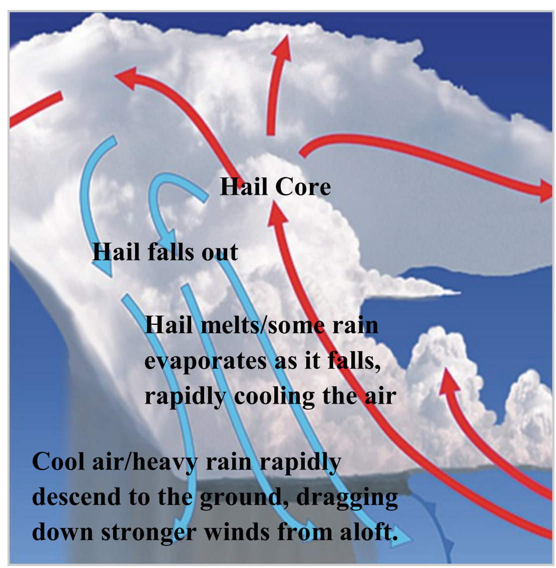


Figure 1: Diagram showing cool air falling towards the surface.

Flood Gages May be Discontinued in Iowa

by Jeff Zogg, Senior Hydrologist

Potential budget cuts in future years may result in the discontinuation of flood gages in Iowa. Any flood gage discontinuations may severely impact the National Weather Service's ability to forecast and detect floods, thus placing lives and property at risk.

Earlier this year, the National Weather Service teamed up with the U.S. Geological Survey and the U.S. Army Corps of Engineers to hold two town hall meetings to address this issue. The first meeting occurred in Council Bluffs on April 7. The second meeting occurred in Iowa City on June 7. The purpose of these meetings was to not only alert stakeholders and the general public about the potential discontinuation of flood gages across Iowa, but also to begin identifying potential solutions.

Participants at the April 7th Council Bluffs town hall meeting learn about the funding mechanisms of USGS flood gages in Iowa. Photo courtesy of the Iowa USGS.

Although the most obvious use of flood gages is for flood prediction and detection, there are many other uses. Gages are also used by the Iowa Department of Transportation, natural resources agencies, emergency management agencies and water intake owners such as municipal water supply and power plants. In addition, flood gages are used in hydrologic and engineering studies. Information provided by gages lead to safer, more reliable designs for dams, levees and bridges.

The USGS operates and maintains most of the flood gages in Iowa. Specifically, it operates 173 flood gages across the state. The capabilities of these gages differ. Some gages provide only river stage information. The most advanced gages provide automated, real-time stage and river flow information. The river flow information is vital to hydrologists at the National Weather Service in forecasting floods.

In Iowa, the funding mechanisms for the flood gage network are complex. The most advanced flood gages cost $14,900 per year to operate. The USGS typically funds 40% of that amount. The remaining 60% comes from other state and local government agencies, as well as the U.S. Army Corps of Engineers. For some gages the U.S. Army Corps of Engineers funds the full amount.

If any one of the cooperating agencies are not able to provide their share of the funding, then the other cooperating agencies must either pick up the slack or risk losing the gage altogether. In our current economic times, money has become a scare commodity for many people and their families, as well as for companies and government agencies. Thus, the risk has increased that any given cooperating agency may not be able to provide its share of the funding.

For the next fiscal year, which begins in September, the USGS may lose some of the money it uses to fund its share of flood gage operating costs. In Iowa, the USGS states that it may lose $40,000, or 10% of its present annual allotment of $400,000. If that happens, then approximately three flood gages may be discontinued.

Discontinuing a flood gage is not what the USGS, the U.S. Army Corps of Engineers or the National Weather Service want to do. All three agencies will work together to prevent such discontinuations. If such discontinuations are inevitable, then the three agencies will work with each other as well as with state and local officials to discontinue gages that would have the least possible impact on public safety. A loss of any flood gage, however, will have a negative impact on the National Weather Service's ability to anticipate floods. The question would be how much of an impact.

The USGS, U.S. Army Corps of Engineers and the National Weather Service are also looking into alternative methods involving river gaging. We are trying to identify methods which may be less costly and at least as effective as present methods. The USGS offers flood gages which are less advanced than their most popular gages. These gages may only measure stage. Although these gages may cost half, or less, as much as their most advanced gages, they do not provide the river flow information which is important in forecasting floods.

In addition, the Iowa Flood Center—located at the University of Iowa in Iowa City—has developed a new, relatively inexpensive automated stream stage sensor. This sensor measures river stage and automatically transmits the data to a Web server for viewing in a Web-based map interface. The Iowa Flood Center has already been working with the Iowa Department of Natural Resources to deploy dozens of these sensors to various locations statewide. Although the information provided by these gages is useful, it mainly supplements the USGS flood gage network. Just as the USGS river stage-only flood gage, the Iowa Flood Center sensors do not provide the river flow information which is vital to accurate flood prediction.

Contact Jeff Zogg, Senior Hydrologist at the National Weather Service in Des Moines if you have any suggestions, ideas, or questions.

USGS flood gage along the West Fork Des Moines River near Emmetsburg, Iowa. Photo by Jeff Zogg, NWS Des Moines

Related Websites:

[NWS Des Moines AHPS Web page]

[USGS in Iowa]

[Iowa Flood Center]

Dual Polarization Radar Coming to the National Weather Service

by Roger Vachalek, Senior Forecaster

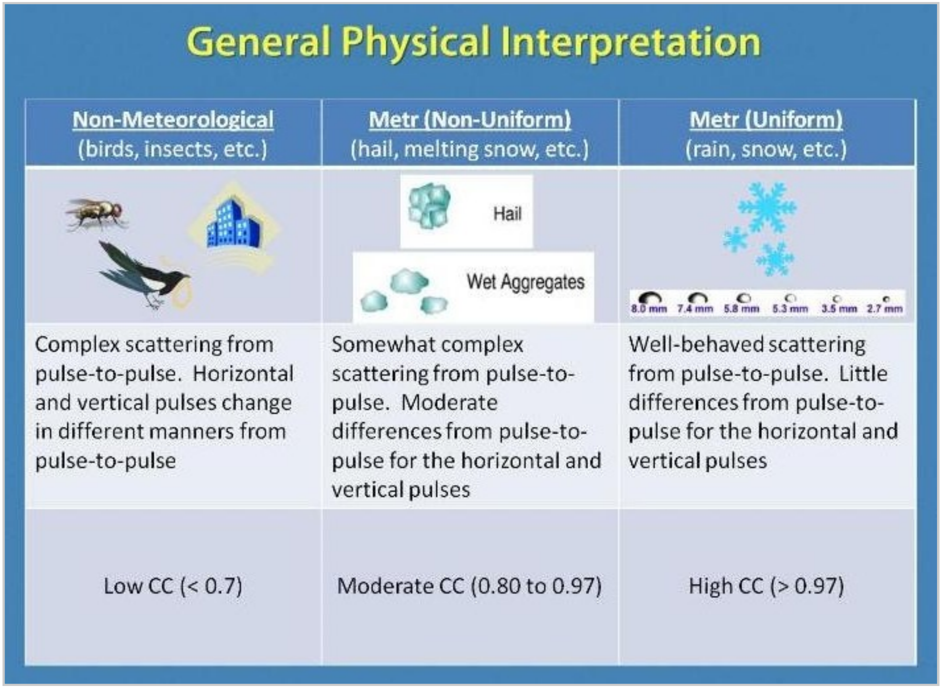


Figure 3: Correlation coefficient can help distinguish targets

Dual Polarization radar will someday be a part of the entire National Weather Service including the office here in Johnston, Iowa. Right now Dual Polarization Doppler Radar is still in what is called a test-bed operation, with only a limited number of forecast offices using it in real time operations. Dual Polarization Doppler Radar will bring new tools and ways to analyze radar data.

What is Dual Polarization Radar?

Current NWS Doppler Radar only transmits and receives energy in a horizontal direction and so the information about meteorological scatterers comes from only one orientation of radar pulse. In contrast, Dual Polarization (Dual Pol) Doppler radar splits the power of energy, into both horizontal and vertical signals (Figure 1). Both are sent out to a target at the same time and the return signal is viewed by two receivers that process both the horizontal and vertical signals (Figure 2). The transmitted pulse is oriented 45 degrees because of the simultaneous transmission of vertical and horizontally polarized energy.

What does the extra dimension provide?

The added vertical transmission results in the ability to get information about the shape of the precipitation, precipitation type within the cloud, and orientation of the precipitation across the radar beam. The addition of an extra dimension will allow forecasters to improve upon winter weather now-casting, detection of heavy rainfall, precipitation versus non-precipitation determination, hail versus large hail detection, thunderstorm updraft detection and tornado debris signatures which can confirm tornado touchdown.

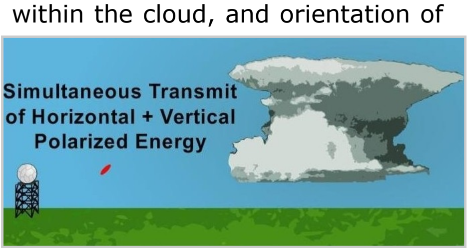


Figure 1 (Top): Dual Pol Signal Sent
Figure 2 (Bottom): Dual Pol Signal Received

There are a number of new concepts associated with Dual Pol radar and they include correlation coefficient (CC), differential reflectivity (ZDR), specific differential phase (KDP), hydrometeor classification (HC), melting layer (ML), and Dual Pol QPE (Quantitative Precipitation Estimate) products. We'll take a look at a few of these concepts in the following paragraphs.

Correlation Coefficient (CC)

The correlation coefficient (Figure 3) measures how similar the horizontal to vertical polarized pulses are behaving within a pulse volume. The more similar they behave, the higher the correlation between the two pulses. The CC allows forecasters to better determine a meteorological scatterer (rain, snow, hail) from a non-meteorological scatterer (insect, bird, or building). It can also help forecasters determine the difference between uniform and non-uniform meteorological scatterers. This will allow forecasters at the Johnston WFO to determine the difference between hail, melting snow (non-uniform) and raindrops and snowflakes (more uniform). As shown in Figure 3, the CC varies between the three types of scatterers sufficiently to examine some differences. When there is a mixture of precipitation as in the graphic that follows, it is even possible to determine which form might be most present within the cloud producing the precipitation. The CC can also help forecasters with the melting layer, determining large hail, and debris from a tornado which indicates if the tornado is on the ground.

Differential Reflectivity (ZDR)

Differential reflectivity is defined as the difference between the horizontal and vertical reflectivity factors in dBz units (decibel units). This allows the meteorologist to

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Dual Pol

(Continued from page 14)

learn something about the shape of the back scattered hydrometeor (Figure 3). Differential reflectivity (Figure 4) gives the forecaster information about the average drop shape of the dominant precipitation type within the radar's beam. As in the diagram below, the precipitation may be more spherical, horizontally oriented or vertically orientated. The spherical objects are most associated with drizzle or small hail; horizontally oriented objects are associated with larger rain drops and melting hail and the more vertically oriented objects are associated with ice crystals compared to actual snowflakes. Because of these relationships, ZDR can be used to more easily locate areas of heavier rainfall because it shows up as a much larger value of ZDR, areas of hail, especially larger hail, and the properties of snow can also be detected. For instance, snow will have a low ZDR when it is dry and aggregated, while wet snows will have a higher ZDR because it is beginning to acquire a water coating and to the radar appears more like a giant raindrop. Recall that dry snow refers to a high snow to water content and wet snow is closer to a 10 inches or less of snow per 1 inch of water equivalent. ZDR can also be used to help locate biological targets such as birds and insects as well as ground clutter and tornado debris.

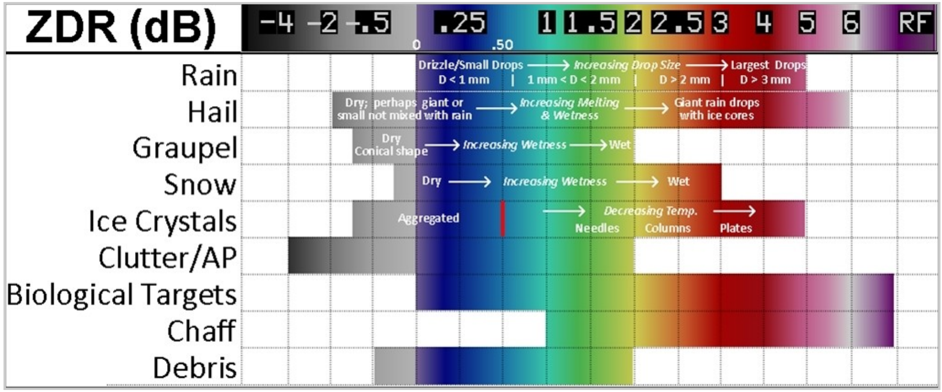

Figure 4: Reflectivity can help distinguish targets

<u>Hydrometeorological Classification (HC)</u>

Meteorologists can take all the data from the Dual Pol Radar and put it together to use it to determine the most likely type of precipitation in the radar's beam. This is called hydrometeorological classification (HC). Figures 5 and 6 show the types of targets that we are trying to determine. This is basically an automated process of the previously mentioned techniques and applications of the Dual Pol Radar. This automated function is used to alert the meteorologist of possible significant features that the radar is seeing at a particular instance. However, the meteorologist must still use some of the unprocessed output to confirm that the HC scheme is correct. Meteorologists do this all the time in warning situations and in forecasts. They are always confirming that the products they use are accurate. The output from this classification is also used to help estimate quantitative precipitation, or the amount of rainfall or snowfall.

<u>Summary</u>

Dual Polarization Radar (Dual Pol Radar) will give the forecasters and warning meteorologists at the National Weather Service in Johnston many new tools to examine storms and precipitation heading into Central Iowa. With the current Doppler radar, meteorologists can examine many elements of storms and precipitation, but we currently cannot learn a lot about the characteristics of the precipitation – like the shapes and sizes of the rain drops, hail, and snowflakes or ice crystals. This added information will give the meteorologists at the NWS a better understanding of the weather processes happening in our area in real time. With that information, we can make a better forecast or more precise weather warning. Though all tools have many benefits, they also have limitations that must be understood. In order for the meteorologists at the NWS Office in Johnston to take full advantage of this new radar technology, a period of significant training will occur prior to its installation. That day is hopefully coming in the next few years. Once that happens, some exciting and significant changes will occur at a Doppler radar near you!

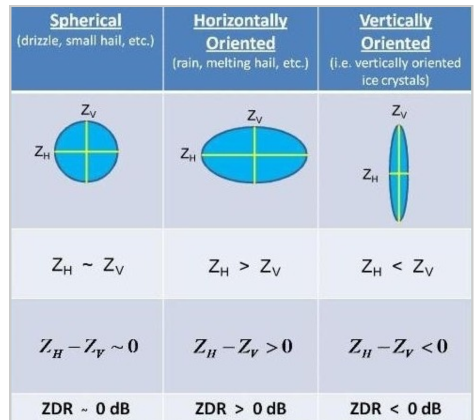

Figure 5: Types of targets radar is trying to determine.

Figure 6: Types of targets that can be identified by Dual Pol


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